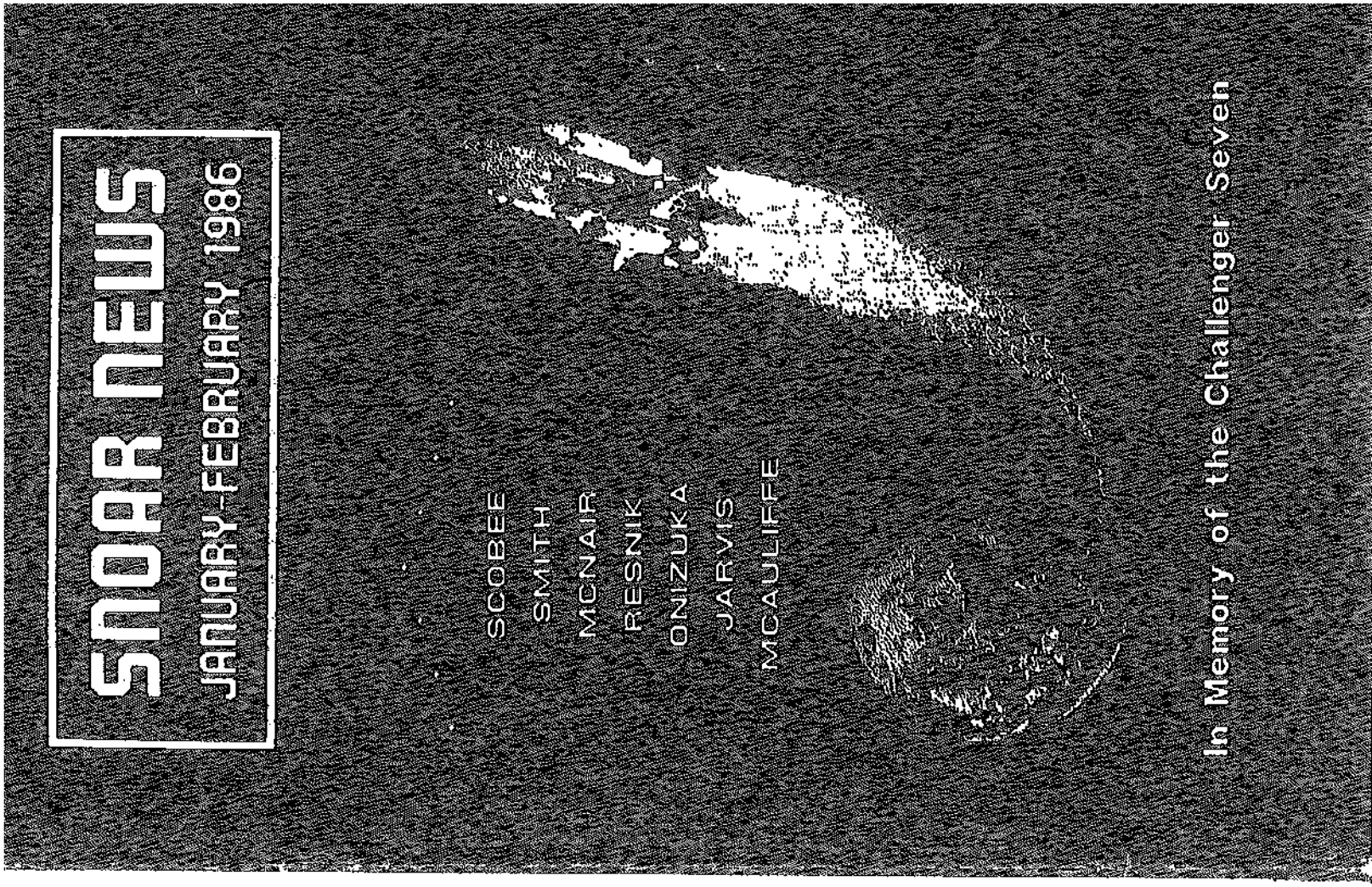

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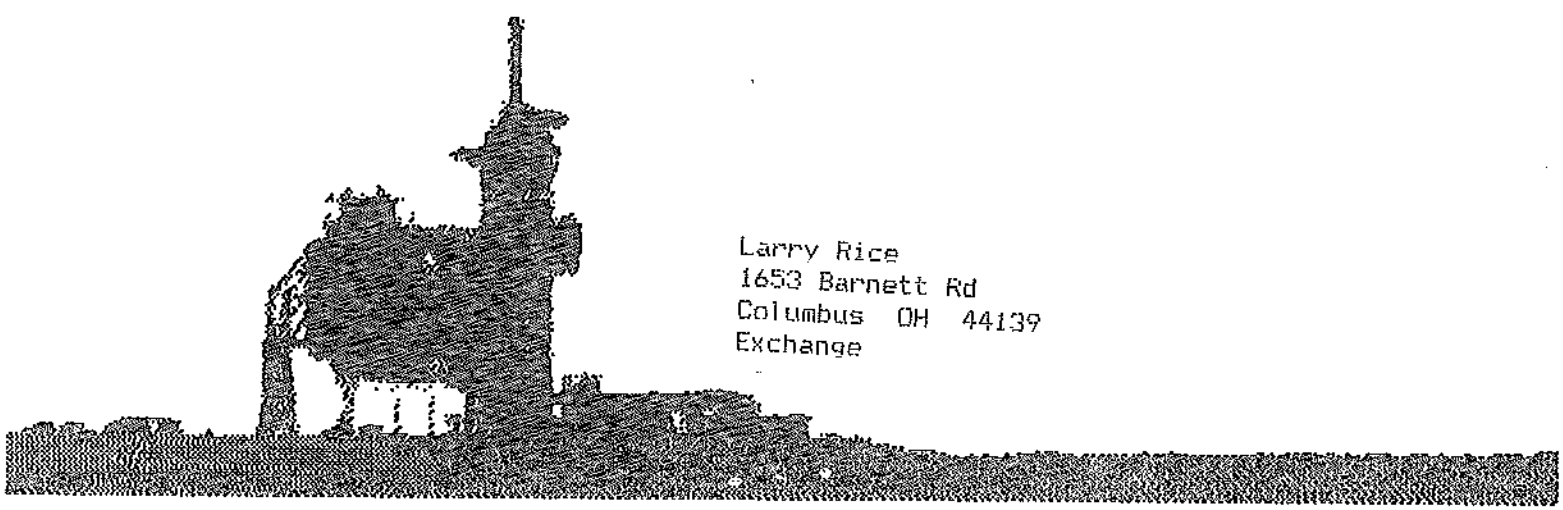

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SNOAR NEWS

January/February, 1986
VOLUME 12, NUMBER 1

1985 LAC Newsletter Award Winner

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COVER:

"Go Forward Towards the Stars" A breathtakingly subtle tribute to the Challenger 7 by George Gassaway, with help from Sam McNully.

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SNOAR, NAR section #337, prints this thing every once in a while. This is ***Volume 12, Number 1***. SNOAR, SNOAR NEWS, and IMPACT copyright ©1986 by the SNOAR. Subscription price is now $10.00 in HARD CURRENCY, although sexual favors may be substituted. Make your checks payable to Matt Steele, and Matt Steele only! "SNOAR NEWS" just doesn't cut it at the bank!

PUBLISHING FUNDS: *COURTESY OF NORTH COAST ROCKETRY.*
(we gotta put that in, according to the accountant)
P.S. I like dark beer, for all of those who asked.

Tragedy has touched us all.

We would like to express our sympathies and sense of loss to the family and friends of the Challenger crew, as well as to NASA and all who are involved in the space program.

In a very real sense, the explosion of Challenger and the loss of the crew is like a death in the family. Nearly all of us who fly rockets are interested in the space program as well. NASA has been very helpful to many modelers in providing scale data, special passes for launches, and even sites for NARAMs (such as NARAM-12, 21, 25 and 27 at Johnson Space Center) Astronauts such as Fred Hauck have attended NAR and International contests. Many of us in the hobby work for NASA or contractors on various aspects of the space program. NAR member and former trustee Jay Apt was selected just last year to become a shuttle mission specialist.

We hope that the cause of the accident will be found soon and corrected so that we may never witness such a disaster again. Space travel may have lost it's innocence, but it will never lose it's importance for the future of mankind.

We must salute the seven astronauts who perished in the fireball that destroyed Challenger 51-L. Our hearts go out to them and to their families, who, likes us all, have lost so much. We will truly miss them. Not only did they perish, but with them went the dreams and hopes of many of us. It touched us in many ways. Let us regroup, and renew our determination to press forward, to pioneer. We owe it to the crew of Shuttle Mission 51-L.

The entire SNOAR NEWS staff

Final Report of the Barber Blue Ribbon Commission on High Power Rocketry

INTRODUCTION:

This report is the result of a wide-ranging year-long study conducted by the National Association of Rocketry (NAR) Blue Ribbon Commission on High-Power Model Rocketry. This Commission of the hobby's most experienced technical talent was formed by the President of the NAR in January 1984. The Commission was directed to investigate the safety implications of a proposal to expand the allowed size of model rockets and model rocket engines. A period of one year was allowed to complete this investigation and to provide a report to the NAR Board of Trustees for their use in coming to a decision on this proposal.

The size limits for model rockets in the United States have been 1 pound (454 grams) liftoff weight, 4 ounces (113 grams) since the early days of the hobby. Recent advances in model rocket propulsion technology have made substantially more powerful engines available for hobby use, and these engines have made rockets larger than 1 pound both feasible and increasingly popular.

This investigation provided a technical basis for the NAR Board of Trustees to decide if the scope of model rocketry could be expanded to encompass activities with larger rockets without jeopardizing the hobby's extraordinarily good 27-year safety record. Its conclusions are based on literature searches, interviews with experienced users of the high-power rockets, computer simulations, theoretical analyses, and several experimental tests. The available time and talent were sufficient to complete every necessary area of the effort.

Based on the results of its work, the NAR Blue Ribbon Commission developed a revision of the NAR/HIAA Safety Code. This revision expands the model rocket weight and power limits. It also tightens and clarifies many areas in the Code where the current rules, based purely on empirical experience, had overlooked potential hazards which were uncovered by the Commission's safety analysis or by consumer experience. The Commission recommends adoption of its proposed Code.

BACKGROUND:

The hobby of model rocketry was founded in 1957. For the first 12 years of the hobby, every model rocket engine used black powder as a propellant. While this inexpensive, low-energy propellant system worked fine in small engines, it was very unreliable in engines larger than 20 N-sec and such

engines were very heavy. No black powder engine larger than 60 N-sec has ever been marketed. However, because of its low cost and high reliability in small engines, black powder and paper casings are still used in all model rocket engines smaller than 20 N-sec.

Over the 27-year history of all of model rocketry, approximately 200 million models have been launched. Well over 40,000 of these were rockets with 30 N-sec or more of power. The incidence of reported damage or injuries is less than one per million flights. There have been no fatal injuries, nor any incidents involving aircraft damage. Most safety incidents have resulted from either total disregard of the Safety Code or from deliberate abuse.

The first model rocket engines to use a modern propellant system were the Enerjets, available between 1969 and 1973. These used ammonium perchlorate and polyurethane plastic, case in a very heavy fiberglass casing, and were available in 40 N-sec through 80 N-sec powers. Performance, reliability, and especially shipping problems kept these from being an economic success or from really changing the nature of model rocketry.

Starting in 1978 several new companies applied the latest generation of professional propulsion technology (ammonium perchlorate and an elastomeric polymer called HTPB) in lightweight casings to produce extremely reliable high performance model rocket engines of 40-80 N-sec. This made supersonic flight by model rockets feasible for the first time. The performance and weight of these engines quickly made them very popular in sport and competition flying.

Shortly after the new engines became available, the NAR performed an extensive series of tests and studies which convinced the U.S. Department of Transportation to relax its regulations and permit inexpensive shipment modes for model rocket engines containing up to 62.5 grams of propellant. While this limit only allows shipment of black powder engines up to 55 N-sec, it permits up to 130 N-sec with the new technology propellants. Engines of this size were offered for sale soon after the ruling.

The new technology engines have made it feasible for hobbyists to fly reliable models of up to 5 kilograms (11 pounds) liftoff mass and over 600 N-sec power using model rocket construction materials. Such flights can be conducted legally if FAA clearance and, in most states, some form of state or local permits or licenses are obtained. Because of their modeling challenge, payload capability, and impressive flight performance, large models using multiple "F" (80 N-sec) and "G" (120 N-sec) engines have become popular with many experienced adult model rocketeers. Today there are at least 300 regular participants in this activity, conducting a thousand or so flights each year in six to ten organized launch sessions.

The level of craftsmanship among participants in high-power rocketry activities far exceeds the average found at typical model rocket launches. The freedom from liftoff weight constraints has led some of these modelers to develop large and sophisticated electronic and photographic payloads, and electronic staging and ejection systems. These types of payload range up to 500 grams in mass, while their rocket boosters are generally about 1 kilogram including engines. Models heavier than 1.5 kilograms are generally super-size sport designs.

Because the NAR does not permit its members to fly rockets outside the limits of the current NAR/HIAA Safety Code, high-power modelers generally leave the NAR. They conduct their operations with no formal and accepted safety code except the very general Unmanned Rocket requirements of Federal

Aircraft Regulations. Under these rules, metal airframes are permissible. Because of the general maturity and good judgment of the participants and the remote nature of their launch sites, there have not been any major damage or injury incidents from these high-power activities after several thousand flights.

SUMMARY OF FINDINGS:

The NAR Blue Ribbon Commission on High Power Model Rocketry has thoroughly evaluated all aspects of model rocket safety, including proposals to raise the weight and engine power limits of model rockets.

The proposal to increase the liftoff mass limit to as high as 1.5 kilograms would result in a reduction in the altitude, velocity, acceleration, and boost kinetic energy of model rockets. It would not increase their overall hazard if accompanied by adjustments to the NAR/HIAA safety Code to limit wind speeds at launch, require adherence to maximum recommended liftoff weights, and require use of a launcher of adequate length. It would permit a vast array of new developments in payload technology.

The proposal to eliminate the power limit of 80 N-sec for model rocket engines would allow engine power to be limited by a 62.5 gram propellant mass limit. This is accompanied by a proposal to increase the propellant mass limit per rocket to 125 grams. If accompanied by a revision of the NFPA Code 1122 to limit engine average thrust, these proposals would result in only small increases in rocket velocity, altitude, and kinetic energy. This would cause a slight increase in safety hazard; the point of significant increase in hazard with power is actually at the transition from 20 N-sec black powder engines to 40 N-sec composite engines.

Several recommendations for revisions to improve the safety of the NAR/HIAA Safety Code were developed which are independent of the proposed increases in rocket mass and power. These include a prohibition against flying into clouds, addition of a requirement for an ignition disconnect switch, addition of a requirement to advise spectators of an impending rocket launch, and a prohibition against long fuses in ignition systems.

The Commission recommends acceptance of the proposals to increase the liftoff mass, propellant mass, and engine power limits of model rockets. A revised Safety Code is offered to implement this. The Commission believes that overall model rocket safety will improve under this new Code.

PROPOSED REVISIONS TO CODES AND REGULATIONS

NAR/HIAA SAFETY CODE

This revision is proposed to replace the current Code. Underlined portions represent significant changes.

1 CONSTRUCTION. My model rockets will be made of lightweight materials such as paper, wood, rubber, and plastic, without any metal as structural parts.

2 ENGINES. I will use only pre-loaded factory-made NAR safety-certified rocket engines in the manner recommended by the manufacturer. I will

not alter or dismantle model rocket engines or their ingredients in any way or attempt to reload these engines.

3 RECOVERY. I will always use a recovery system in my model rockets that will return them safely to the ground so that they may be flown again. I will use only flame-resistant recovery wadding in my rockets.

4 WEIGHT LIMITS. My model rockets will weigh no more than 1500 grams (53 oz.) at liftoff and the engines will contain a total of no more than 125 grams (4.4 oz.) of propellant. My model rockets will weigh no more than the engine manufacturer's recommended maximum liftoff weight for the engines used, or will use the engines recommended by the manufacturer for my rocket.

5 STABILITY. I will check the stability of my model rockets before their first flight, except when launching models of already proved stability.

6 PAYLOADS. My model rockets will never carry live animals or payloads that are intended to be flammable or explosive.

7 LAUNCH AREA. I will launch my model rockets outdoors in a cleared area, free of tall trees, power lines, and buildings. I will ensure that people in the vicinity are aware of the pending rocket launch and are in a position to see the rocket's liftoff before I begin my audible 5-second countdown.

8 LAUNCHER. I will launch my model rockets from a rod or other device which provides rigid guidance until the rocket has reached a speed adequate to ensure a safe flight path. To prevent accidental eye injury, I will always place the launcher so that the end of the rod is above eye level, or will cap the end of the rod when approaching it. I will cap or disassemble my launch rod when not in use and will never store it in an upright position. The launch device will have a jet deflector to prevent the engine exhaust from hitting the ground directly. I will always clear the area around my launch device of brown grass, dry weeds, and other easy-to-burn materials.

9 IGNITION SYSTEM. The system I use to launch my model rockets will be remotely controlled and electrically operated, and will contain a launching switch that will return to "off" when released. The system will contain a removable safety interlock in series with this firing switch. When launching, all persons will remain at least 15 feet from any model rocket when igniting engines totaling 30 N-sec of total impulse or less and at least 30 feet when igniting engines totaling more than 30 N-sec total impulse. I will use only electrical igniters which will ignite my rocket engine within one second of actuation of the launching switch.

10 LAUNCH SAFETY. I will not let anyone approach a model rocket on a launcher until I have made sure that the safety interlock has been removed or the battery has been disconnected from the launcher. In the event of a misfire, I will wait one minute before allowing anyone to approach the launcher.

11 FLYING CONDITIONS. I will launch my model rocket only when the wind is less than 20 miles per hour, and under conditions where the model will

not fly into clouds, fly near aircraft in flight, or be hazardous to people or property.

12 PRE-LAUNCH TEST When conducting research activities with unproven designs or methods, I will, when possible, determine their reliability through pre-launch tests. I will conduct launchings of unproven designs in complete isolation from persons not participating in the actual launching.

13 LAUNCH ANGLE. I will not launch rockets so their flight path will carry them against targets. My launch device will be pointed within 30 degrees of vertical. I will never use model rocket engines to propel any device horizontally.

14 RECOVERY HAZARDS. If a model rocket becomes entangled in a power line or other dangerous place, I will not attempt to retrieve it.

NFPA CODE 1122 and NAR SPORTING CODE

1) Incorporate revised NAR/HIAA Safety Code. 2) Eliminate power limit of 80 N-sec per engine. 3) Eliminate specification of 0.05 sec minimum engine burn time and replace with the following table of minimum burn times:

Engine Power	Minimum Burn Time
80.01 N-sec or above	1.6 seconds
40.01 - 80.00 N-sec	1.0 sec
20.01 - 40.00 N-sec	0.5 sec
10.01 - 20.00 N-sec	0.25 sec
10.00 N-sec or below	0.05 sec

'85 CUBAN MISSILE CRISIS

BY DEB SCHULTZ

On October 13th, the 1985 Cuban Missile Crisis was again threatened with rain. However luck was with us as sunny skies and highs in the low '80's prevailed for the flying. Almost everyone arrived at the pre-set time of 11 AM. By noon, rockets were taking to the air. Among the notables present were Chuck Mund, John Holmboe, Don and Donna McPherson, and Herb Desind. Don Carter and Mark Weber from ACS Reaction Labs were there to demonstrate their new line of motors. Lots of Crafts was represented by Ron and Deb Schultz, with their kit line fully visible. Between flying rockets and catching up with friends, LOC distributed Aerotech and Vulcan catalogs. Everyone was surprised to see J. Pat Miller, NAR President, who was there to observe high power activities.

Chuck and John flew numerous flights including a G60 powered Demon, and a Nike-Ram that was powered by a variety of motors. Mike Nelson flew a LOC EZI-65 with a Ace/Kline Visijet I motor. The boost was spectacular, and parachute deployment perfect. Herb Desind was able to get in quite a few Cineroc flights including a few at the L&K motel while we were eating breakfast. Don McPherson flew nothing less than H120's for the duration of the meet. Tom Blazanin flew his Hustler with a F130, and it really screamed off of the pad! He also flew his outstanding Sidewinder took off with a G25. Brian Rau and Bill Kust flew several models on F40's and D12's. Glen Strickland flew a "2650" with 3 F100's for real fire and smoke.

As you might have guessed, LOC came out in force. Deb Schultz's Pink "Leggs" rocket flew, complete with gold lame" parachute. The Mini-Magg was popular powered by an H120. The Graduator, a new kit, made it's maiden flight on an F41. The biggest and most impressive of the demo flights was "JAWS IV", powered by 3 H120's. One H failed to ignite (Ron's fault) and the flight only went to 3,500 feet or so. Recovery was perfect.

With the flying finished, the 40 or so participants packed up and made plans to attend the upcoming year's schedule of events: LDRS-West in Las Vegas in June, LDRS-5 in Medina in August, and Cuba '86 in the fall.

SNOAR NEWS RAISES PRICES!

Yessiree, Matt has finally found the bottom of his pocketbook! After losing so much money on the newsletter last year (in excess of $1000), our accountant (who doubles as a stand up comedian and male stripper) said get the operation in line. So, subscription prices have gone up to $10.00 per 8 issues, effective February 1, 1986. Also, the number of freebies have been reduced, so if you're used to getting a free issue before, and your label says "Last issue", you'll have to pay to get more SNOAR NEWS. Sorry 'bout that!

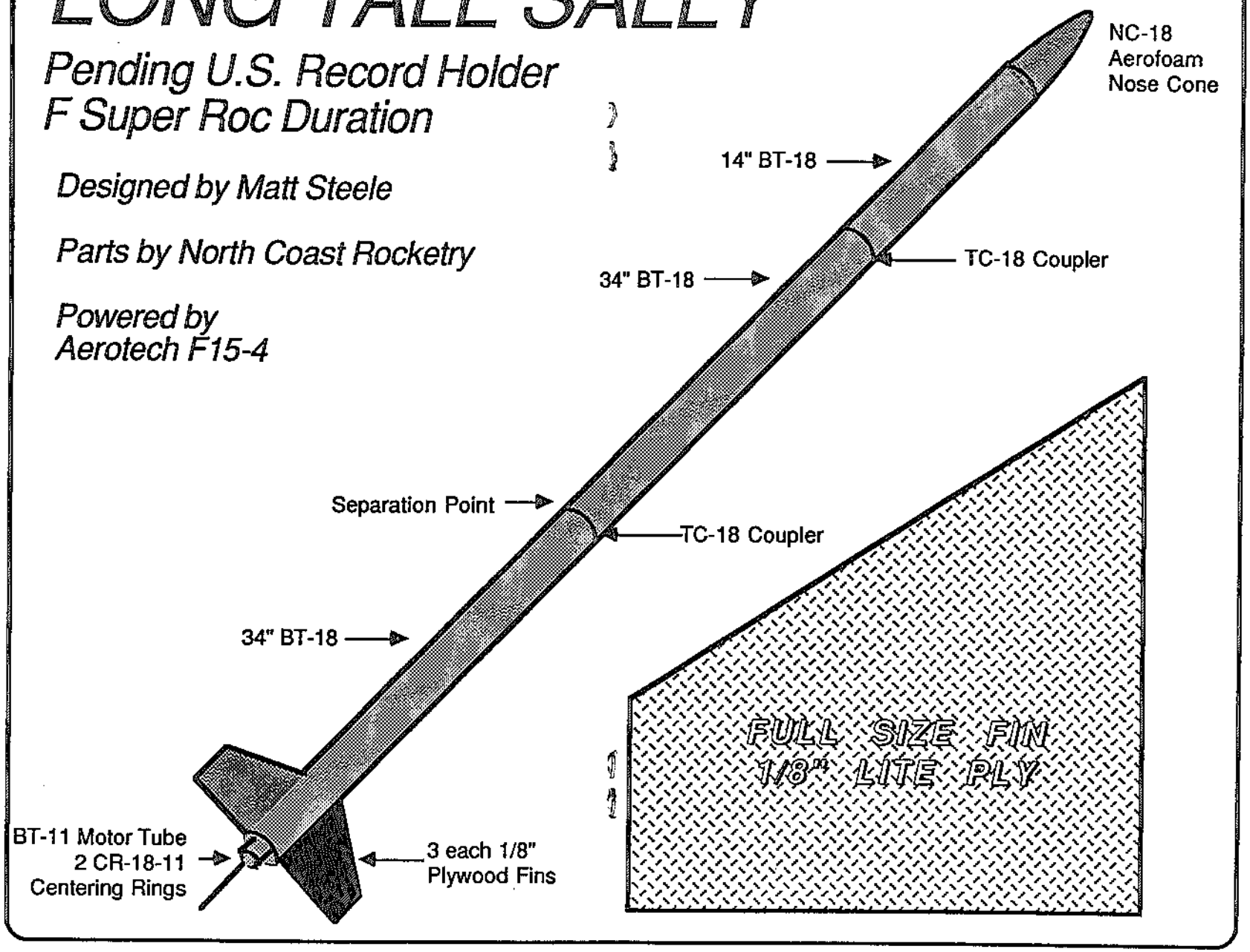
LONG TALL SALLY

Pending U.S. Record Holder
F Super Roc Duration

Designed by Matt Steele

Parts by North Coast Rocketry

Powered by
Aerotech F15-4



G. Harry Stine: OBSERVATIONS ON HIGH POWER

(Editor's Note: This was report was written for the Barber Commission.)

Flying a variety of G powered models required no safety or operational procedures more stringent than those now required for existing model rockets. Flying G powered model rockets is just like flying E powered and F powered model rockets except for one factor: G powered models cost much more to fly. Considering the wild and woolly F powered models this author has seen since we first got Type F motors in 1959; considering that the author has quietly watched an attempt to launch (unsuccessfully, I might add, but it was spectacular!) a five-stage model of clustered Estes D12s from a small city park in Phoenix; considering that the worst reported high-power incident resulted in only very minor injuries and occurred with a national team at an FAI World Championships; and considering the experience of these flight tests, extreme concern over higher power and higher weights is probably unwarranted in light of our accumulated experience today. This is not to say that originally our concern was unnecessary or totally unwarranted because it led us to conduct a series of careful and thorough tests which has, at least in my own mind, allayed a number of fears and proved them unfounded.

No changes in the existing NAR-HIAA Safety Code are recommended if the Association decides to increase the gross liftoff mass and allowable total impulse of model rockets. This recommendation is based upon the fact that the flight tests were safely conducted under the existing NAR-HIAA Safety Code and conditions identical to those that are used for the launching of model rockets propelled with motors up to Type F. Therefore, I do not recommend a dual Safety Code. The existing one is broad enough to serve well with any potential increase up to a gross liftoff mass of 1.0 kilogram and to a motor total impulse of 160 Newton-seconds, provided that Section 4 is suitably amended to reflect the gross liftoff mass increase.

I do recommend that the Section 4 limit of 4 ounces of propellant be retained until additional evidence and the results of future flight tests indicate that this limit may be safely increased. Given the requirement that this report be in the hands of the Chairman of the Blue Ribbon Committee by 1 December 1984, there was insufficient time to conduct additional flight tests involving clustered and staged Type G models. This should be done in the near future to determine whether or not the 4-ounce propellant limit is realistic from a safety stand point. However, such models are extremely expensive to fly. An increase in allowable propellant weight may not be required in view of the increased power available from Type G motors should their certification be approved by the NAR. Right now, single-staged Type G high-performance models push the limits of the state of the art in tracking technology beyond the point where the models can be optically tracked. They also push the limits of the state of the art in materials and construction. And they provide adequate power to propel a one-kilogram model to reasonable altitudes.

I do not recommend that specific standards be set forth in the Safety Code

relating to launch rod lengths and diameters. Models powered by Type G motors were successfully launched from 3-foot and 4-foot rods during these tests. In fact, high-power models were successfully launched from a standard Estes Porta Pad with an Estes 3/16-inch diameter aluminum launch rod 36 inches long.

I do not recommend that range personnel or spectators be required to stand at excessive distances from the launch pads. A 50-foot distance is adequate and safe. The simple rule used to date suffices: the person launching the model should be just far enough away to be beyond the radius of flying pieces or parts in case of a catastrophic failure. Actually, being closer than 25 feet requires that one snap one's head back too quickly to follow the bird. The models flown with Type G125- motors cannot be seen to leave the launcher at all, they disappear and then reappear about 100 feet in the air if one is fast enough to look up.

If the proposed increase in power and weight is approved, I would recommend that a new competition event in the Pink Book be authorized at this time: an altitude event for 160 Newton-second single-staged models. I would further recommend that Type G motors and the 1 kilogram gross liftoff mass be authorized for the Scale and Super Scale events. There are several reasons for this:

1. I learned during the flight tests that the general level of craftsmanship in model rocketry has declined in the past ten years. Many of the principles of design and construction that we used for Type F model rockets in the 1960s have been forgotten. I'm as guilty of forgetting as anyone else. Many of my old Class F models would have flown well with Type G motors. Most of the old Centuri model rockets intended for Mini-Max motors would have done well, too. Generally, models are now built more lightly and in a less robust manner than in the 1960s. This may be due to a greater tendency on the part of model rocketeers to build from kits, especially kits intended for lower-powered motors. Materials today are far lighter and less robust than previously used. Thin-walled body tubes, thin plastics, and rapidly-setting bonding agents are now quite ubiquitous in the hobby.

2. Models built for Type F black powder motors may not be robust enough to withstand the increased forces and rapid force onsets inherent in composite motor operation. As Bruce Rogers pointed out during the tests, black powder motors are considerably "softer" in their action than composites. This was borne out time and again during the flight tests. Thrust build-ups are longer with black powder motors because of the way they're ignited; even core-burner Type F motors are usually ignited at the nozzle rather than at the head end of the core as is the general procedure with composites. Therefore, the composites have a faster thrust build up and kick the airframe hard and fast. Even some models designed for FSI F100s won't stay together with a G70, as I discovered.

3. A large percentage of the models specifically designed and built for Type G motors in this flight test program suffered from design and construction problems. For example, most of them used 1/32" sheet plywood fins. Properly designed 1/8" balsa wood fins covered with silkspan or tissue and then doped would not only be far stronger but would offer a greater bonding area which, in turn would help prevent fin stripping. Reinforcing fin root joints with doped tissue overlay fillets is apparently a forgotten trick today, we used to use it all the time for Class F models in the early 1960s. (Note. It may not be necessary to outlaw thin plywood fins on high-power models, the mechanics of keeping fins on may provide the incentive to eliminate this material anyway. Thin plywood fins have no technical features

to recommend them over thicker, properly airfoiled, tissue-coated balsa wood fins.) Fins often stripped not because the fin joint failed in bending but because the forces exceeded the shear strength and layer separation strength of the paper body tube itself.

4 Many high-power modelers utilize epoxy and cyanoacrylate bonding agents which have a tendency to grow soft and lose their strength at elevated temperatures. Nearly all the fins that stripped were on models with a tight fit between the outer body tube and the motor casing, even when "pin-hole" bonding techniques were used. As Bill Stine pointed out, the heat transfer from the motor casing to the body tube may have caused the fin bonding agent to soften, thereby causing the fins to strip after a second or so into the flight. *(Ed: Huh? Not likely!)* Models with a larger external body tube and an inner engine mounting tube generally retained their fins in flight.

5 Many design principles that we used during the 1960s for Type F models have apparently been forgotten, as well. Among these are strong and efficient fin planforms and airfoils. Subsonic parabolic nose cones may offer far less drag in the subsonic regime but are barn-doors at transonic and supersonic speeds. Beautiful, slick, shiny finishes may be very efficient at low subsonic speeds but are meaningless at supersonic speeds. These are but a few examples. Once we designed model rockets as though they were going to fly at Mach 5 when, at most, they might hit Mach 0.5; now the pendulum has swung to where the models are designed to fly well at Mach 0.1 while capable of achieving more than Mach 1.

Because of all these factors, the authorization of a Type G altitude event will push the technology of high-powered models, including design and construction. It will encourage craftsmanship because, without craftsmanship, Type G altitude models simply will not stay together. It will push the development of new and improved tracking technology because, as it stands today, Type G models are consistently capable of flying beyond the capability to be tracked. Any progress in tracking technology will have strong effects on our ability to consistently and accurately track models of lower power and performance.

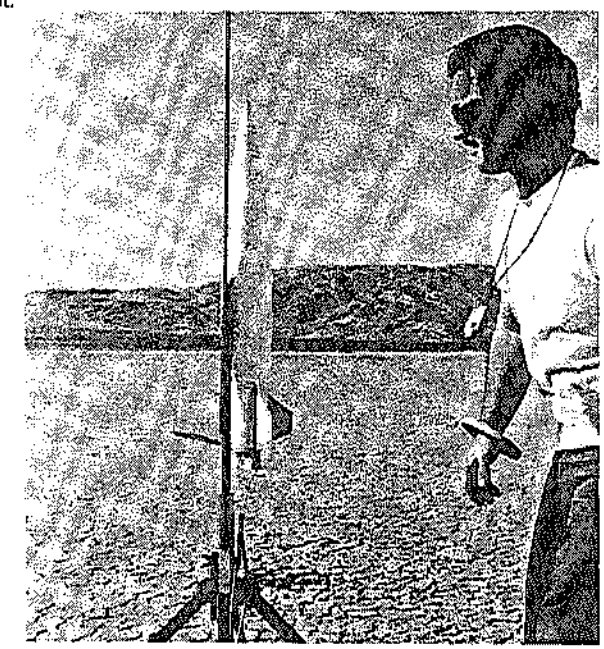
The authorization of Type G motors and one-kilogram gross liftoff masses for Scale and Super Scale may revolutionize these events, permitting larger and more detailed scale models. It will also emphasize craftsmanship which is so important in model rocketry and which we have demonstrably lost.

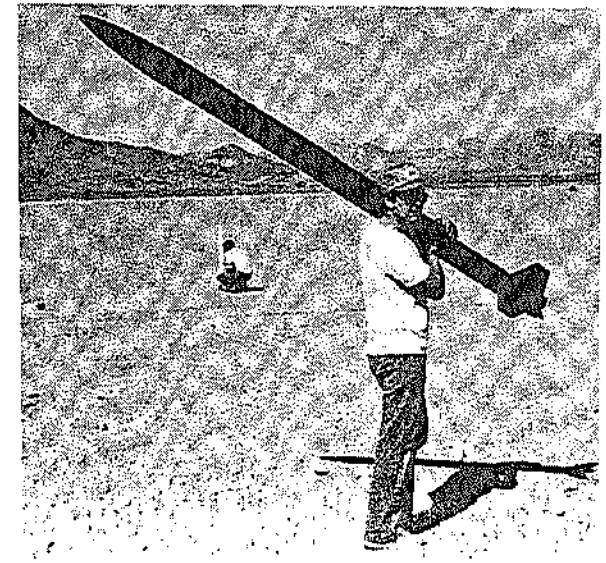
Finally, I recommend that a continuing series of flight tests be conducted to determine the actual factors involved in increasing the propellant weight limit and in staging and clustering Type G motors (because this will certainly be done). The brisance of the liftoff of a cluster of Type G motors would be something to be experienced! I can hardly understand why one would want to cluster Type G motors because these composites, unlike black powder motors, are totally smokeless and flameless. As for stunning performances, they can certainly be achieved safely with single staged high performance G powered motors!

In conclusion: In 1965, I wrote about the reluctance of the Academy of Model Aeronautics to embrace model rocketry into the fold of model aviation in 1958 because of untested and unwarranted fears on the part of some AMA officials at that time. I stated that I hoped we model rocketeers would learn from that experience and not turn our backs on the next advance in the aeromodelling field when it occurred. I believe that advance has taken place. I am pleased to have had a part in its careful consideration for incorporation into our hobby.

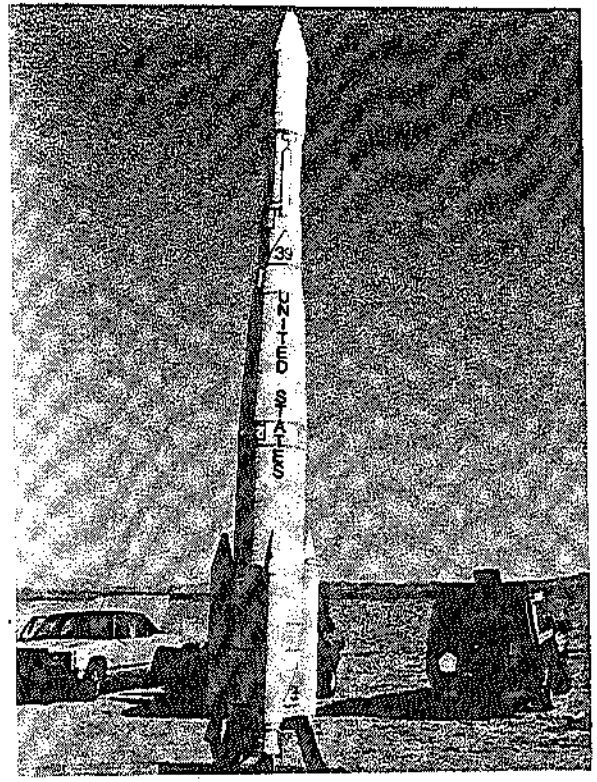
LUCERNE LAUNCH!

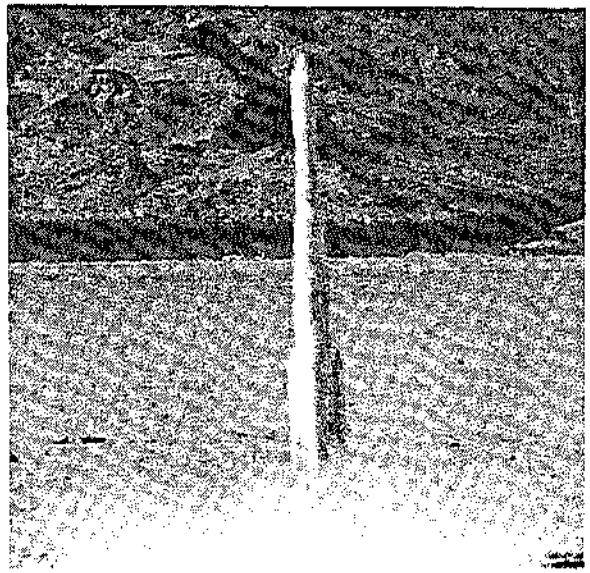
Noted SNOAR correspondent Wasco Shafter provided these photos of the November 2, 1985 Lucerne, CA launch. **Below**, Korrey Kline preps a 2 G120 supersonic attempt. The rocket shredded spectacularly about 30-40 feet up. In the **bottom photo**, a Lots of Crafts Magnum is prepped for flight Powered by three H120's only two ignited, resulting in a low, but safe flight.





Below: A very nice Delta built by Marc McReynolds lifts off with a central D12 and 3 mini A motors.





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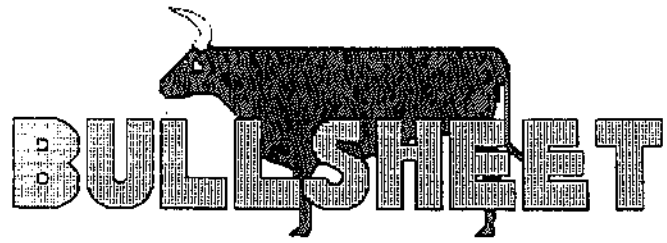
Of course, there are a few names missing. For example, where's Don McPherson, Jon Randolph, Philbert, Alan Tuskes, Tom Banker, Mike Nowak, Larry Chumlea, Dave Dailey, John Squirrek, Frank Perl, or Aaron Bernstein? Or, how about Grant Leiby, John Fleischer, Dave Gloger, Wolf Karpinski, Mark Vople, and Bob Murphy? What can you say? I guess it's just lucky to have kept this many members for the past 12 years or so that SNOAR has existed!



The new Estes catalog is here! The new Estes catalog is here! It looks as though they've decided that most of us out there want more scale birds, since that's where it appears most of the effort went to. Those of you who saw Bruce Carey's Black Brant III at NARAM-27 won't be too surprised to see that it ended up a kit for this year. If it's anything like Bruce's NARAM model, this kit will be a winner. Also in the offing is the Nike Apache, another scale model that looks like it was given a better than average treatment by Estes. Other new items of interest include the "Electron Beam" Launch controller (should be great with rechargeable NI-Cad AA batteries), a new "updated" Big Bertha (no it's not 10 feet tall!), an updated Scout (the Scout II), a mini engine version of the IQSY Tomahawk (combined with the Exocet in a combo pak), the "Hitchhiker" styrofoam parasite glider, the "Dragon Fly" BG (a real surprise from Estes....should help all those A divisioners out there who have never built a BG), and the "Crusader "swing wing, which is just plain weird. Estes's concession to the "Hype of the Year" is "Halley's Tail" with, yep, you guessed it, a free fall "comet" at ejection. (What? No Kadet/ Photon Torpedo/ Dune whatever/Etc. clone this year? And you'all had such a streak going!) No killer Skill Level 5 kits this year, but the mighty D12 is now $5.49 a pack. Hey, c'mon guys!

North Coast Rocketry enters it's third year with an expanded product line, including new high-power kits, improved motors, additional parts and service that is second to none.

In the new parts department, NCR is now offering three new sizes of airframe and motor tube. These are the BT-7 (18mm ID), BT-15 (1.530" ID) and the BT-21 (2.140" ID). The BT-7 is for use with the new 18mm D and E motors, with a wall thickness nearly twice that of an Estes BT-20. It is available in lengths of 24". The BT-15 and BT-21 both with a .060" thick wall. These super strong tubes were designed primarily for use with the new 1.5" and 2.125" industry standard Class B motors. Couplers, centering rings, and motor adapters will be available.

Incorporating these new motor tubes will be the Hypersonic 1800 and Hypersonic 2300. Both are near minimum diameter for super high altitude flights using Class B motors. They will feature Parastreams and through-the-wall fin attachment.

One of NCR's most popular kits has been upgraded. The Phantom 4000-HD is the perfect bird to fly Class B motors in, thanks to two new motor mount options and super strong construction techniques. The NCR Magna and the NCR Katana are two new "have it your way" kits. Both feature six different motor mount combinations to choose from. The Magna stands over seven feet tall, large enough to make people think twice about calling rockets toys. The Brighthawk is a new, scale like kit, designed with the exacting modeler in mind. This is a bird that looks great close up, thanks to the 100 tiny screws used for various detail parts, and the custom decal sheet. Scaled around the BT-26, it is big enough to be impressive, yet can fly on F motors. The Hypersonic Seduction is a grown up version of the Sonic Seduction, the

Hypersonic Seduction uses a 4.0" main body tube, and is powered a a cluster of three 1.5" motors.

North Coast Rocketry now offers Custom Fabrication Services. NCR will modify any kit in our line to suit your exacting needs, as well design specific rockets if you desire. If you are interested in duplicating a non-available kit, NCR can help out.

NCR has discontinued a few items. The NCR Replica Ace kits are available on a limited basis, and when these are gone, there will be no more. Contact us for availability. We regret that we will no longer carry the Lots of Crafts Pre-Fabricated kits. They are still available directly from Lots of Crafts, High Power Division.

NAR Membership is at 3000+! This is the first time in 15 years that it's been that high. Membership levels are expected to peak between 3500-4000 sometime this summer. The NAR's all-time high membership was 5502 in 1970, the high point of the space program. The low, low, low points were in 1978 (1560) and 1983 (1870).

The higher power changes to NFPA Code 1122 (Code for Model Rockets) was approved by a 12-0 vote (with one abstention). A full vote is expected in November 1986 following a comment period. It is highly likely that the code will be approved. NAR members are likely to be able to fly under the new provisions (i.e., 1500 grams, 2 G motors) by 1 January 1987, although there may still be the need to secure permits until each particular state approves the code (which could take 3-5 years). The FAA is expected to change the Federal Aviation Regulations by 1 Jan 87, so FAA clearance won't be needed. Thank old G. Harry, guys. He's been twisting arms* behind the scenes.

The Punk, er, Pink Book Revision Committee is being headed up by George Gassaway. Those interested in helping to shape the new competition rules should drop a line to George at: P.O. Box 59012, Homewood, AL 35259.

Congratulations go to Phil Barnes and his new bride, Yolanda. Seems that Yolanda was our interpreter in Poland for the 1983 Internats, and came to the US shortly after the meet. Who says rocketry doesn't lead to true love?

The Aerotech 18mm wonder motors have been safety and contest certified. It looks like they should be contest certified by March. The G60 and G125 motors are undergoing the final work to give them smoky burns, and should be available soon.

Well, here it is February 1986, and we have yet to see another issue California Rocketry since the Feb 85 issue announced that they "had a problem with timeliness". Will we ever see another issue?

Jim Barrowman replaces Dan Meyer as the Blue Ribbon Commission Chairman. Dan resigned due to professional and personal considerations. Jim should be an outstanding replacement. He was involved in the Barber commission, as well as RSO for the '80 Internats, and past president of the NAR. By April 15, the commission is expected to present a preliminary reply the the LDRS-HPR committee.

Clarification: LDRS-West is in June in Las Vegas. LDRS-5 will be held in Medina in August. Catch both great events!